A DISSERTATION ON

"A COMPREHENSIVE STUDY ON GENITOURINARY TRAUMA IN RGGGH"

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CHENNAI-3

THE TAMILNADU DR.M.G.R.MEDICAL UNIVERISTY,

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CHENNAI - 600 032

MAY – 2018

CERTIFICATE

This is to certify that the dissertation titled **"A COMPREHENSIVE STUDY ON GENITOURINARY TRAUMA IN RGGGH"** is the bonafide work done by **Dr.A.S.MOKAN RAJ**, during his M.S. General Surgery course 2015-18, under my guidance and supervision in partial fulfillment of the rules and regulations laid down by The Tamil Nadu Dr. M.G.R. Medical University, Chennai for M.S. (Branch-I) General Surgery Examination, MAY 2018.

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DECLARATION

I, declare that this dissertation titled **"A COMPREHENSIVE STUDY ON GENITOURINARY TRAUMA IN RGGGH"** represents a genuine work of mine. The contributions of any supervisors to the research are consistent with normal supervisory practice, and are acknowledged. I also affirm that this bonafide work or part of this work was not submitted by me or any others for any award, degree or diploma to any other University board, either in India or abroad. This is submitted to The Tamil Nadu Dr. M.G.R Medical University, Chennai in partial fulfillment of the rules and regulations for the award of Master of Surgery Degree Branch- I (General Surgery).

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Date:
Place:

ACKNOWLEDGEMENT

As I walk down the memory lane, I realize with a deep sense of humility that what I have done now would not have been possible, but for certain luminaries, who have enlightened my path to wisdom.

“Surgery is learnt by apprenticeship and not from textbooks, not even from one profusely illustrated ” - Ian Aird. While I put these words together it is my special privilege and great pleasure to record my deep sense of gratitude to my revered Professor and guide **Prof. S.BALAKRISHNAN M.S.,** but for whose constant guidance, help and encouragement this research work would not have been made possible. The unflinching academic, moral and psychological support will remain ever fresh in my memory for years to come . Words cannot simply express my gratitude to them for imparting me the surgical skills I have acquired.

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I also thank my fellow postgraduates , friends and colleagueswho have extended their co - operation in my work.

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With deep reverence, I salute my parents, My wife **Mrs.C.Sowmya.B.E.,** and I thank the almighty for blessing me with a wonderful family to whom I have dedicated this thesis and leave unsaid what they mean to me.

Dr.A.S. MOKAN RAJ

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CERTIFICATE OF APPROVAL

To
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Dear Dr.A.S.Mokan Raj,

The Institutional Ethics Committee has considered your request and approved your study titled **"A COMPHRENSIVE STUDY ON GENITOURINARY TRAUMA IN RGGGH" - NO.22012017 (III).**

The following members of Ethics Committee were present in the meeting hold on **24.01.2017** conducted at Madras Medical College, Chennai 3

1.Dr.C.Rajendran, MD.,	:Chairperson
2.Dr.M.K.Muralidharan,MS.,M.Ch.,Dean, MMC,Ch-3	:Deputy Chairperson
3.Prof.Sudha Seshayyan,MD., Vice Principal,MMC,Ch-3	: Member Secretary
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12.Thiru S.Govindasamy, BA.,BL,High Court,Chennai	: Lawyer
13.Tmt.Arnold Saulina, MA.,MSW.,	:Social Scientist

We approve the proposal to be conducted in its presented form.

The Institutional Ethics Committee expects to be informed about the progress of the study and SAE occurring in the course of the study, any changes in the protocol and patients information/informed consent and asks to be provided a copy of the final report.

Member Secretary – Ethics Committee

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CERTIFICATE-II

This is to certify that this dissertation work titled **"A COMPREHENSIVE STUDY ON GENITOURINARY TRAUMA IN RGGGH"** of the candidate **Dr.A.S.MOKAN RAJ, M.B.B.S.,** with Registration Number **221511006** for the award of **MS Branch-I,** in **General Surgery.** I personally verified the urkund.com website for the purpose of plagiarism Check. I found that the upload thesis file contains from introduction to conclusion pages and result shows 7% (Seven percentage) of plagiarism in the dissertation.

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CONTENTS

INTRODUCTION

INTRODUCTION

Trauma is defined as a physical injury or a wound to living tissue caused by an extrinsic agent. Trauma is the sixth leading cause of death worldwide, accounting for 10% of all mortalities. It accounts for approximately 5 million deaths each year worldwide and causes disability to millions more.

Genitourinary trauma accounts for 10% of total trauma victims due to various modes of injury like road traffic accidents, blunt injury, penetrating injury, accidental fall and others.

Genitourinary trauma is seen in both sexes and in all age groups, but is more common in males.

A trauma surgeon does the initial evaluation and resuscitation. For that it is important to know about the mechanism of injury, its extent and the methods used in the initial resuscitation process and their success rates.

AIMS AND OBJECTIVES

AIMS AND OBJECTIVES

1. To study the clinical and imaging parameters and decide upon the line of management in genitourinary trauma

2. To study the clinical outcome of patients managed conservatively.

3. To study the profile of various other associated injuries.

4. To study the role of multidisciplinary approach in genitourinary trauma

REVIEW OF LITERATURE

REVIEW OF LITERATURE

EMBRYOLOGY

KIDNEY AND URETER

Three excretory organs develop from the intermediate mesoderm. Pronephros are never functional and degenerate on days 24 or 25. Mesonephros appear late in the 4th week. Mesonephros along with portion of Pronephric duct forms Mesonephric or Wolffian duct.

The medial head of Mesonephric tubules forms Bowman's capsule, lateral branches from the Aorta form capillaries that become Glomeruli forms renal corpuscles. The Mesonephric tubules open into the Mesonephric duct. Metanephric diverticulum (ureteric bud) arises on day 35. It gives rise to collecting tubules, major and minor calices, the renal pelvis and the ureters.

The ureteric bud grows into the Metanephric mesoderm and enters in to the urinary bladder. The Metanephric mesoderm gives rise to the nephrons and opens into the collecting duct. During the ascend kidneys rotate medially so that the hilum faces medially.

URINARY BLADDER AND URETHRA

The cloaca, a cavity lined with endoderm develops around the 4th or 5th week and receives the allantois and the mesonephric ducts. The urorectal septum, a transverse ridge divides the cloaca into an anterior urogenital sinus and posterior Rectum. Vesical portion forms the urinary bladder and continues with the allantois. Pelvic portion forms the Prostatic and membranous portions of the urethra in the male and the membranous urethra in the female. Phallic portion forms the penile urethra in the male and vestibule of the vagina in the female. The caudal ends of the mesonephric ducts forms the trigone of the bladder.

PENIS

The genital tubercle is responsible for the development of penis, under the influence of testosterone.

TESTIS

Medulla of Genital ridge forms the seminiferous tubules, rete testis, interstitial cells, fibrous septa and intrinsic coverings of the testis. Efferent ductules are derived from the proximal 12 to 15 mesonephric tubules. Canal of the epididymis and vas deferens are developed from the mesonephric duct.

SCROTUM

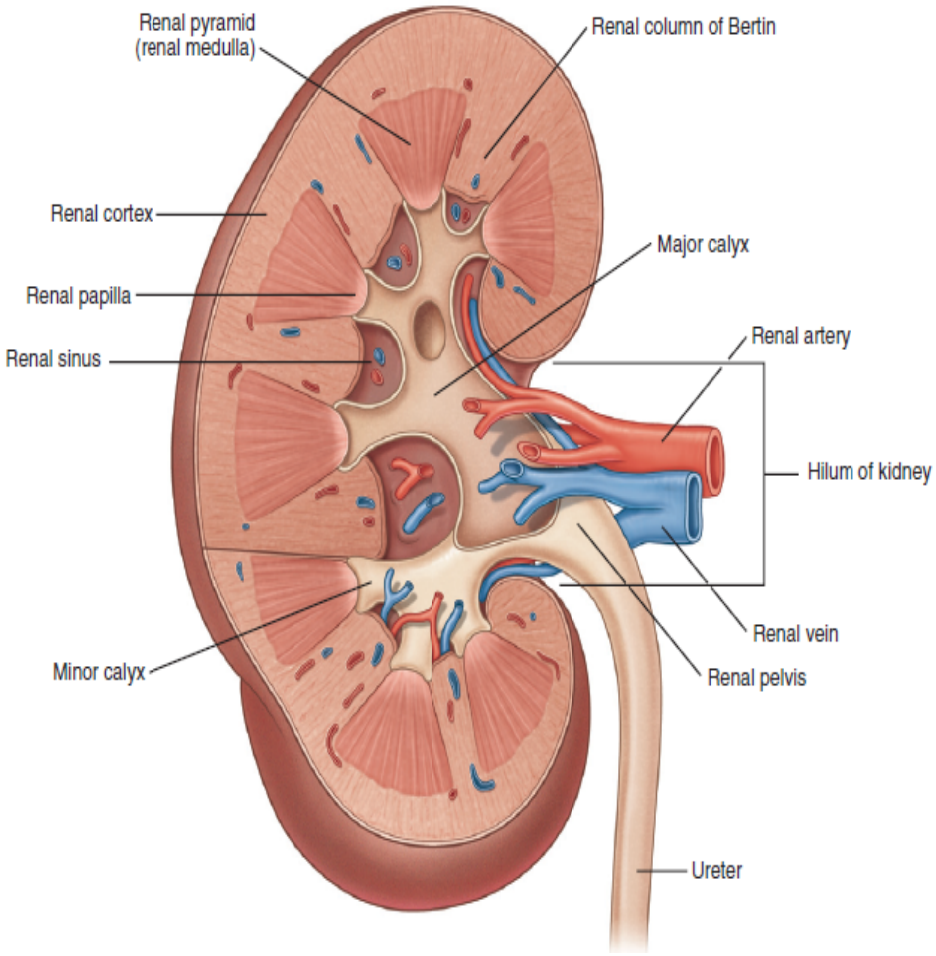
The formation of the scrotum as a result of the fusion of right and left labio scrotal folds. A scrotal septum separates into two halves.

SURGICAL ANATOMY :

KIDNEY

The kidneys are paired organs just inferior to the adrenal glands. These organs are completely enveloped within the perirenal fascia (gerota fascia) and are mobile structures supported only by the perirenal fat, renal vasculature, abdominal muscles and viscera.

Right kidney is 2cm lower than the left. Right kidney resides at the level of upper border of L1 to lower border of L3. Left kidney resides at the level of body of T12 to body of L3. Both the kidneys surrounded posteriorly by diaphragm, psoasmuscle, quadrates lumborum and transversus abdominis aponeurosis. Anteriorly, the right kidney is bounded by liver, adrenal gland, descending part of duodenum and hepatic flexure and the left kidney is bounded by adrenal gland, tail of pancreas, spleen, stomach and splenic flexure.


Renal pyramid
(renal medulla)
Renal column of Bertin
Renal cortex
Major calyx
Renal papilla
Renal artery
Renal sinus
Hilum of kidney
Renal vein
Minor calyx
Renal pelvis
Ureter

Both renal arteries arise from aorta and enters the kidney via renal hilum which splits into 5 segmental arteries without any collaterals which further splits to form lobar, interlobar, arcuate and afferent artery to the glomeruli. The venous drainage corresponds to the arterial supply and drains into the inferior vena cavae. At the hilum the structures from anterior to posterior are renal vein, renal artery, and renal pelvis. Lymphatics of kidney follow blood vessels and drains into hilar and paraaortic lymph nodes. Sympathetic preganglionic nerve fibers originate from T8 to L1 and plexus. Parasympathetic fibers arises from the vagus and travel along the sympathetic fibers.

URETER

It is a tubular bilateral structure of 22 -30 cm length. Its wall composed of transitional epithelium, lamina propria, inner longitudinal and outer circular muscle fibers and adventitia, which surrounds the blood vessels and lymphatics.

It begins at the ureteropelvic junction and progresses inferiorly along the anterior edge of the psoas muscle and gonadal vessels crosses them anteriorly. As it enters the pelvis the ureter crosses anterior to iliac vessels.

Anteriorly relations of right ureter are ascending colon, caecum, colonic mesentery and appendix. Left ureter is related to descending colon, and sigmoid colon along with its mesentery.

On entering the pelvis, they diverge widely towards the ischial spine and runs anteriorly and medially to reach the bladder. In males it is crossed anteriorly by the vas deferens. In females it is crossed anteriorly by the uterine artery and closely related to the cervix. Ureter is divided into upper, middle and lower segments.

1) Upper ureter extends from the pelvis to the upper border of sacrum.
2) Middle ureter extends from the upper to lower border of sacrum.
3) Lower ureter extends from the lower border of the sacrum to the bladder.

Proximal ureter receives blood supply from renal artery, gonadal artery, abdominal aorta and common iliac artery branches. Distal ureter from internal iliac artery, middle rectal artery and vaginal artery branches. Venous and lymphatic drainage parallels the arterial supply. Sympathetic nerve supply from T10 - L2 and parasympathetic nerve supply from S2-S4 , through renal, aortic, and hypo gastric plexus.

BLADDER

It has superior, two inferolateral, base or posterior surfaces. Superior surface is covered by peritoneum and inferolaterally bladder is cushioned by retro pubic and perivesical fat and loose connective tissue. Base of the bladder is in relation to seminal vesicle, ampulla of vas deferens and terminal ureter.

Bladder neck is situated at the internal urethral meatus. In female the peritoneum over the dome of the bladder is reflected over the uterus to form the vesico-uterine pouch and then it continues posteriorly over the uterus as recto uterine pouch. Hence base of the bladder and urethra rests on the anterior vaginal wall.

Mucosa is lined by transitional epithelium, deep to this is lamina propria which is traversed by numerous blood vessels. Beneath this muscle fibers arranged in inner and outer longitudinal fibers, middle circular fibers.

The bladder wall is pierced by the ureter obliquely and it travels 1.5-2 cm and terminates at the ureteral orifice. The triangular area between the two ureteral orifice and internal urethral meatus is called as the trigone of the bladder.

The bladder is supplied by the superior and inferior vesical branches from the internal iliac artery. Veins of the bladder coalesce to form the vesical plexus and drains into the internal iliac vein. Lymphatics drains along the blood vessels and then into the external and internal iliac nodes. Inferior hypo gastric plexus contains both sympathetic and parasympathetic nerve supply of bladder. Parasympathetic fibers from S2-4 and sympathetic fibers are from T11-L2.

URETHRA

Male urethra is about 18–20 cm long. It is divided into anterior and posterior compartments.

1) Anterior urethra includes glandular, penis and bulbar segments.
2) Posterior urethra includes membranous and prostatic segments.

Prostatic urethra is the widest and most dilatable part of urethra. The narrowest and least dilatable part of urethra is membranous urethra except urethral meatus. Internal urethral sphincter is involuntary and external urethral sphincter is voluntary in nature. The urethra is supplied by vessels of prostate and penis. Lymphatics from the anterior urethra drains into deep and superficial inguinal nodes, posterior urethra drains into the external and internal iliac nodes.

Female urethra is 4 cm long. It begins at the internal Urethral orifice runs downwards and forwards and embedded in the anterior wall of the vagina. It ends at the external urethral orifice.

PENIS

The root of the penis is composed of three erectile masses. Two crura attached to the margin of pubic arch and covered by ischio cavernosus. One bulb is attached to the perineal membrane in between the two crura which iscovered by bulbospongiosus. The deep surface is pierced by urethra. Three elongated masses of erectile tissue forms the body of penis. Two corpora cavernosa is surrounded by tunica albuginea and terminates under the cover of glans penis. The corpora spongiosa is surrounded by a fibrous sheath and expanded at its tip called glans penis. It is traversed by the urethra. Superficial fascia of the penis contains loose areolar tissue and superficial dorsal vein of the penis. The deep fascia of the penis is called Buck's fascia, surrounds all the three erectile masses but does not extends into the glans penis. The deep dorsal vein, dorsal artery, dorsal nerve of the penis are deep to deep fascia.

The penis is supported by the fundiform ligament and the suspensory ligament. The skin covering the penis is thin and elastic, loosely attached to the fascial sheath. At the neck the skin is folded to form the prepuce of the penis. The

internal pudendal artery supplies the penis through the deep artery of the penis which runs in the corpus cavernosa, dorsal artery of the penis and artery of the bulb. The skin supplied by the superficial external pudendal artery. The superficial and the deep dorsal vein drains into the superficial external pudendal vein and prostatic plexus of veins. Sensory nerve supply is derived from the dorsal nerve of the penis and the ilioinguinal nerve. Autonomic nerves derived from the pelvic plexus via prostatic plexus. Lymphatics from the glans drains into the deep inguinal node and rest of the penis drains into the superficial inguinal nodes.

SCROTUM

Scrotal skin is highly folded, devoid of fat and rich in sweat and sebaceous glands. Median raphe separates the scrotum into two compartments. Dartos muscle is derived from the colle's, scarpa's and dartos fascia.

Below dartos lies external spermatic fascia, cremasteric fascia and internal spermatic fascia which are derived from external oblique, internal oblique, transversalis fascia respectively. Anterior part of the scrotum is supplied by superficial and deep external pudendal vessels, ilioinguinal and genital branch of genitofemoral nerve.

Posterior part of scrotum is supplied by scrotal branches of internal pudendal artery and cremasteric branches of inferior epigastric artery, posterior scrotal branches of pudendal nerve and perineal branches of posterior cutaneous nerve of thigh. Lymphatics drain into the superficial and deep inguinal nodes. It does not cross the median raphe.

TESTIS

It is suspended in the scrotum by the spermatic cord. It is enclosed from outside to inside by tunica vaginalis, tunica albuginea and tunica vasculosa. The epididymis gets attached to the posterolateral aspect of the testis.

Tunica albuginea projects to form the mediastinum testis from which septa radiates to form 200-300 lobules. Each lobule contains 2 -3 seminiferous tubules.These tubules join to form a straight tubules which enter the mediastinum. They anastomose with each other to form a network of tubules called rete testis which in turn gives rise to efferent ductules and emerge near the upper pole of the testis and enter the epididymis and continues with the ductus deferens.

The testis is supplied by testicular artery, which is a branch of abdominal aorta at the level of L2 and descends on the posterior abdominal wall to reach the deep inguinal ring and enters the spermatic cord.

The testicular vein starts as the pampiniform plexus around the testicular artery, which forms four veins at the superficial inguinal ring and reunites to form two veins at the deep inguinal ring deep to it forms the single vein. On the right side it drains into the inferior vena cava and on the left side it drains into the left renal vein.

Lymphatic drainage along the testicular vessels which drains into pre and paraaortic lymph nodes. Sympathetic nerve supply from segment T10 which passes through renal and aortic plexus.

PRESENTATION, EVALUATION AND MANAGEMENT

RENAL INJURIES

The incidence of urological tract injury following abdominal trauma is approximately 10%.Renal trauma occurs in approximately 1-5% of all trauma cases. The kidney is the most commonly injured genitourinary organ in all ages with the male-to-female ratio being 3:1

Mode of injury

Renal injuries are classified by their mechanism as blunt or penetrating

Blunt renal injuries

Mechanisms include motor vehicle collision, falls, vehicle-associated pedestrian accidents, sports and assault. Traffic accidents cause almost half of all blunt injuries. Sudden deceleration or a crash injury may result in contusion and laceration of the parenchyma.

Renal vascular injuries generally occur in < 5% of blunt abdominal trauma; isolated renal artery injury is very rare. Renal artery occlusion is associated with rapid deceleration injuries. In theory, the mechanism is arterial traction. The resulting tear in the inelastic intima and subsequent haemorrhage into the vessel

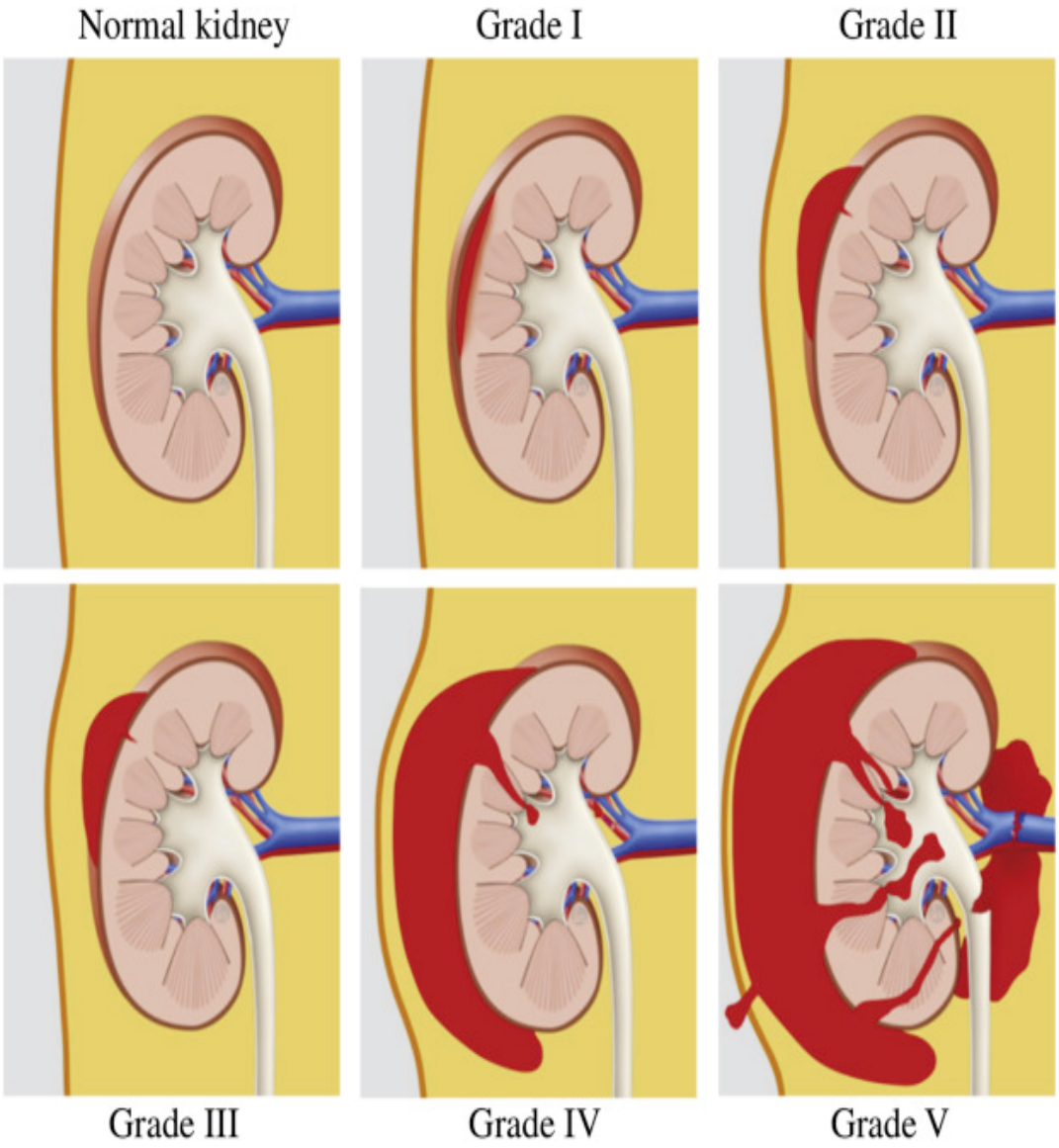
wall leads to thrombosis. Compression of the artery between the anterior abdominal wall and the vertebral bodies may result in vessel thrombosis.

Penetrating renal injuries

Gunshot and stab wounds are the most common causes of penetrating injuries and tend to be more severe and less predictable than those from blunt trauma. Bullets have a higher kinetic energy than knives and so have the potential to cause greater parenchymal destruction and are most often associated with multiple-organ injuries . Penetrating injury produces direct tissue disruption of the parenchyma, vascular pedicles, or collecting system.

CLASSIFICATION

American association for the surgery of trauma organ injury scaling committee classification (AAST) is most accepted classification. Grade I to III clearly established with appropriate studies but grade IV and V have areas of overlap in vascular and parenchymal injuries. Appropriate imaging studies combined with history and physical examination provides the staging information which guides the management.


Normal kidney
Grade I
Grade II
Grade III
Grade IV
Grade V

GRADE	TYPE	DESCRIPTION
I	Contusion	Microscopic or gross hematuria, urological studies normal
	Hematoma	Sub capsular, non expanding without parenchymal laceration
II	Hematoma	Non expanding perirenal hematoma confined to renal retro peritoneum
	Laceration	< 1cm parenchymal depth of renal cortex without urinary extravasation
III	Laceration	> 1cm parenchymal depth of renal cortex without collecting system rupture or urinary extravasation
IV	Laceration	Parenchymal laceration extending through renal cortex, medulla and collecting system
	Vascular	Main renal artery or vein injury with contained hemorrhage
V	Laceration	Completely shattered kidney
	Vascular	Avulsion of renal hilum, devascularizing the kidney.

INDICATIONS FOR RENAL IMAGING

1. Hematuria is used as a sole indicator of renal injury.
2. Blunt injury patients with gross hematuria and microscopic hematuria with shock should undergo renal imaging by IV contrast CT.

3. Penetrating injury patients with any degree of hematuria should be imaged by IV contrast CT.
4. Shock is not a useful parameter in children because they have high catecholamine output which maintains blood pressure and hence imaging should be performed.

IMAGING STUDIES

COMPUTED TOMOGRAPHY

Contrast enhanced CT is the best imaging study, which provides staging information, along with other associated abdominal organ injuries. One major limitation of the study is inability to define renal venous injury.

CT FINDINGS

I	Medial hematoma	Renal pedicle injury.
II	Medial extravasation	Renal pelvic injury or uretero pelvic junction disruption.
III	Lack of parenchymal contrast	Renal artery injury.

Spiral CT has the advantage of rapidity and the disadvantage of requiring delayed films.

INTRAVENOUS PYELOGRAM

It is largely replaced by contrast CT with the exception of single short intraoperative IVP when there is an retro peritoneal hematoma surrounding the kidney. Single film taken ten minutes after IV injection of 2ml/kg of contrast material shows abnormal findings. Main purpose of single shot IVP is to assess the function of contralateral kidney.

ANGIOGRAPHY

To localize arterial bleeding and therapeutic embolization.

ULTRASOUND

To define retroperitoneal hematoma along with associated intra abdominal injury.

NON OPERATIVE MANAGEMENT

98% of blunt renal injuries can be managed non operatively with the exception of grade V vascular pedicle avulsion injury. Grade IV and V injuries requires surgical exploration even these patients can be managed with close observation and abdominal CT scan. If delayed bleeding occurs, angiography with embolization obviate surgical intervention. If urinary extravasation persists beyond

48 hrs requires internal ureteral stenting. The patient should be imaged, well staged, hospitalized and bed rest until hematuria resolves.

OPERATIVE MANAGEMENT

ABSOLUTE INDICATION

1. Persistent renal bleeding.
2. Expanding perirenal hematoma.
3. Pulsatile perirenal hematoma.

RELATIVE INDICATION

1. Urinary extravasation.
2. Nonviable tissue.
3. Delayed bleeding of renal artery injury.
4. Segmental renal artery injury.
5. Incomplete staging

RENAL EXPLORATION

Trans abdominal approach allows complete inspection of intra abdominal organs along with renal exploration. Identification of renal vessels before exploration improves renal salvage rate. Transverse colon and small bowel is

lifted superiorly and it exposes the mid retroperitoneum. An incision made over the Aorta superior to inferior mesenteric artery and extend up to the ligament of Treitz exposes the anterior surface of aorta. Left renal vein crosses anteriorly over the Aorta is dissected and secured. Right renal vein is secured by reflecting the second portion of duodenum. If hematoma obscures the landmarks then inferior mesenteric vein can be used as an anatomic guide.

Incision made medial to inferior mesenteric vein and anterior surface of aorta is made out. Kidney is exposed by incising the peritoneum lateral to the colon followed by Gerota's fascia which requires release of splenic and hepatic flexure attachments of colon.

PRINCIPLES OF RENAL RECONSTRUCTION

1. Complete renal exposure.
2. Debridement of non viable tissues.
3. Perfect hemostasis.
4. Water tight closure of collecting system.
5. Approximation of parenchymal defect.
6. Omental interposition.
7. Retroperitoneal drain.

Renorrhaphy denotes repair of parenchymal laceration. When reconstruction of polar injuries are not possible then partial nephrectomy should be done. Delayed diagnosis of renal vascular injury >8 hrs cannot salvage the kidney. Reno vascular injuries repaired with 5-0 nonabsorbable suture along with endovascular stents or replacement graft by using hypogastric or splenic arteries. In renal pedicle avulsion injury nephrectomy is the procedure of choice. Damage control surgery improves the renal salvage rate.

INDICATIONS FOR NEPHRECTOMY

1. In unstable patients with low body temperature and poor coagulation cannot risk an attempt at renal repair if the normally functioning contralateral kidney is present.
2. In extensive renal injury when the patients life is threatened by renal repair.

COMPLICATIONS

1. Urinary extravasation can result in urinoma, perinephric infection and renal loss and can be managed by systemic antibiotics, internal ureteral stenting and placement of retroperitoneal drain.
2. Delayed renal bleeding usually occurs within 21 days, managed by bed rest, hydration followed by angiography and embolization.

3. Hypertension due to rennin angiotensin axis stimulation by partial renal ischemia caused by stenosis of renal artery, external compression of renal parenchyma and post traumatic AV fistula.

URETERAL INJURIES

Ureteral injuries are rare but more common intraoperatively (80%) than blunt trauma (15%) and penetrating injuries(5%). Surgical procedures involving pelvis and retro peritoneum are responsible for ureteral injuries. Most commonly during abdominal Hysterectomy followed by colorectal, pelvic, abdominal vascular surgeries. Large pelvic mass, reoperation, retroperitoneal inflammation and placement of vascular grafts anterior to the ureter are the risk factors.

Fractured lumbar process and thoracolumbar dislocation due to blunt injury had increased the level of ureteral injury. Uretero pelvic disruption due to rapid deceleration can be missed because of absence of hematuria. Laparoscopic injury is rare but most common during electrosurgical or laser assisted lysis of endometriosis due to endometriosis involving the ureter, intra peritoneal adhesions, deviations of ureter away from its normal position. High index of suspicion is necessary for its recognition. Hydration and diuretic administration can visualize ureteral injury intraoperatively. Preoperative intra ureteral stenting in high risk

cases avoids ureteral injury. Injection of 5 – 10 ml of IV Indigo carmine dye followed by cystoscopy after laparoscopic procedure ensures the patency of ureters.

Fever, flank pain, abdominal distention, peritonitis, urinary fistula and leukocytosis herald the possibility of missed ureteral injury. Rigid ureteroscopy, ureteroscopy in irradiated tissues, thermo- ablation of renal tumor occasionally associated with ureteral injuries. Lower pole and medially located tumors, microwave therapy are high risk factors.

DIAGNOSIS

1. Hematuria.
2. Intraoperative recognition of urinary leak.
3. Retrograde ureterography.
4. Intraoperative 1- 2 ml of methylene blue dye injected into the renal pelvis can stain and spill the local tissues.

GRADING

American association for the surgery of trauma organ injury severity scale for the ureter.

Grade Type Description

Grade	Type	Description
I	Hematoma	Contusion or hematoma without devascularization
II	Laceration	< 50 % transaction
III	Laceration	> 50 % transaction
IV	Laceration	Complete transaction with < 2 cm devascularization
V	Laceration	Avulsion with > cm devascularization

IMAGING STUDIES

EXCRETORY UROGRAPHY

Intra operative one shot pyelography with intra operative inspection to detect ureteral injuries.

COMPUTED TOMOGRAPHY

1. Medial extravasation of contrast or non opacification of the ipsilateral ureter on contrast CT.
2. Spiral CT with delayed films after contrast injection.

RETROGRADE URETEROGRAPHY

To delineate the extent of injury in missed ureteral injuries and simultaneous placement of ureteral stent.

ANTEGRADE URETEROGRAPHY

It is seldom used now except where retrograde stent placement is not possible.

MANAGEMENT

Repair of ureteral injury is based on the length and location of the injury.

PRINCIPLES OF URETERAL REPAIR

1. Mobilization of ureter with care to preserve the adventitia.
2. Debridement of the nonviable tissue up to the bleeding edge.
3. Spatulated, tension free, stented, watertight anastomosis.
4. Omental interposition.
5. Placement of retroperitoneal drain.

UPPER AND MID URETERAL INJURIES

URETEROURETEROSTOMY

For upper ⅔ of ureteral injury and large areas of contusion which leads to micro vascular injury results in ureteral necrosis can be managed by ureteroureterostomy i.e. end to end repair. For stable patients primary repair with

stenting for 8 weeks. For unstable patients planned staged repair, tie off the damaged ureter using long silk to aid in dissection during second stage operation. Otherwise percutaneous placement of nephrostomy tube or placement of 8-f feeding tube into the ureter exteriorizing it until repair can be completed.

Rarely nephrectomy is required in ipsilateral severe renal injury, severe pan ureteral injury and persistent ureteral fistula. When a large segment is destroyed creation of ureteral conduit from ileum is used in delayed or staged repair called as Monti procedure. Appendix can also be used for interposition.

COMPLICATIONS

1. Urinary leakage.
2. Urinoma, abscess and fistula formation.
3. Peritonitis.
4. Ureteral stenosis.
5. Stone formation.

TRANSURETEROURETEROSTOMY

It is indicated when there is an extensive ureteral loss. It involves bringing the injured ureter across the midline and anastomosing it end to side to the

uninjured ureter with double J stent placement. Usually it is performed in delayed or staged repair.

LOWER URETERAL INJURIES

URETERONEOCYSTOSTOMY

The free end of the proximal ureter is debrided, spatulated and tunneled in the sub mucosal plane which is superior and medial to the native ureteral orifice. The length should be three times that of the diameter of the ureter towards the direction of bladder neck and the repair should be stented postoperatively along with SPC and Foley's catheter. SPC can be removed in 7-10 days, Foley's catheter can be removed when the urine is clear and the stent should remain for 8 weeks.

VESICO PSOAS HITCH

The bladder is mobilized in the space of Retzius and ligating the contralateral superior vesical pedicle aids in mobilization. The bladder is opened vertically and tented up against the ipsilateral psoas muscle, nonabsorbable sutures are placed in the bladder wall outside the epithelium and in the psoas muscle away from genitofemoral nerve and ureter is reimplanted.

BOARI'S FLAP

It is useful in bridging long gaps in ureteral continuity. The bladder is swung cephalad and tabularized to bridge the gap of injured ureter.

SURGICAL INJURY

Sutural ligation and surgical clips are removed and stented. In complete transection of ureter retrograde stenting and repair should be done. If it fails, ante grade stenting and nephrostomy should be done. In ureteroscopic injuries ureteral stenting should be considered.

BLADDER INJURIES

Bladder injuries after blunt or penetrating trauma are rare. It constitutes < 2% of abdominal injuries requiring surgery. Bladder injuries after blunt trauma are most commonly associated with pelvic fracture. Most of the bladder injuries are the result of road traffic accidents, accidental fall, crush injuries. Iatrogenic injury can occur during gynecological procedures.

Two types of bladder injuries:

Extra peritoneal rupture (> 90%) is more common than the intra peritoneal rupture (< 10 %).

DIAGNOSIS

HEMATURIA

1. Any degree of hematuria is significant in penetrating injuries.
2. In case of blunt injury lower abdominal pain, tenderness, bruising are present and urinary catheter does not drain urine in bladder injury.

IMAGING STUDIES

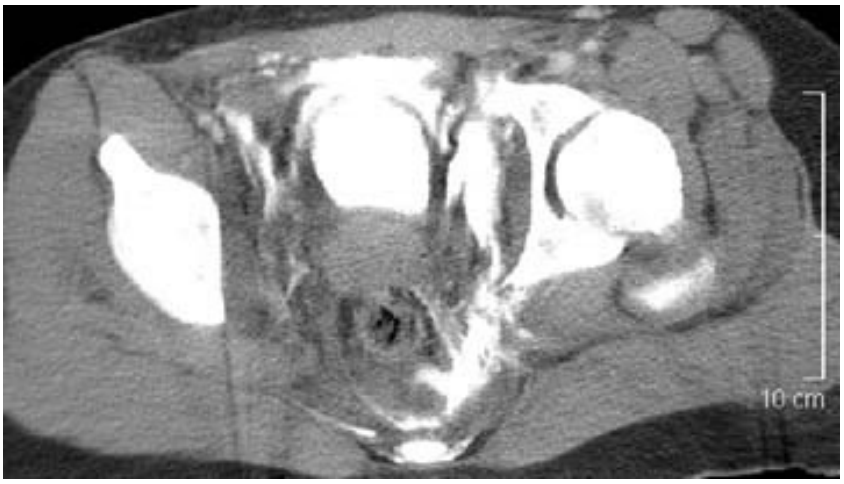
RETROGRADE CYSTOGRAPHY

1. Gross hematuria with associated pelvic fracture is an absolute indication for immediate cystography.
2. Gross hematuria without pelvic fracture, microscopic hematuria with pelvic fracture, isolated microscopic hematuria are relative indication for cystography.

It provides a 95% accurate results. Retrograde filling of bladder with 350 ml of 30% contrast material diluted with the saline, AP and oblique films provides excellent results. Dense flame shaped collection of contrast in the pelvis is characteristics of extra peritoneal rupture. Sunburst appearance from the bladder dome with the collection in the paracolic gutter outlines the loops of bowel is characteristic of intraperitoneal rupture.

CT CYSTOGRAPHY

It involves retrograde placement of contrast material through the urethral catheter followed by CT scan of the pelvis .



The scan shows contrast filling the bladder with extravasation of contrast into the extraperitoneal spaces (anteriorly = space of retzius (r), laterally and posteriorly (arrows)). Contrast is contained in the extraperitoneal spaces

Contrast outlines bowel loops in the peritoneum. This is diagnostic of intraperitoneal bladder rupture

CLASSIFICATION AND MANAGEMENT

I. CONTUSION

Hematuria without extravasation indicates bladder contusion. It is managed by catheterization and observation up to clear urine drain. Follow up cystography before removal of catheter.

II. EXTRAPERITONEAL RUPTURE

It is most commonly managed by catheter drainage alone.

CONTRAINDICATIONS FOR CONSERVATIVE MANAGEMENT

1. Bone fragment projecting into the bladder.
2. Open pelvic fracture.
3. Rectal perforation

RELATIVE INDICATION FOR OPEN REPAIR

1. Other associated abdominal injuries.
2. At open repair the bladder is opened at the dome and by using self retaining retractor the bladder mucosa is visualised. Extra peritoneal lacerations are closed from inside with absorbable sutures.

COMPLICATIONS

Open repair has fewer complications when compared to non- operative management.

1. Vesico cutaneous fistula.
2. Failure to heal.
3. Sepsis.

III.INTRAPERITONEAL RUPTURE

Intraperitoneal rupture requires open repair with two layered closure by using absorbable sutures and placement of perivesical drain.

COMPLICATIONS

1. Persistent urinary leakage.
2. Failure to heal spontaneously.
3. Chemical peritonitis and death.

Injury involving the ureteric orifice should be stented or reimplanted. Supra pubic drainage along with Foley's urethral drainage and omental interposition followed by cystography after 7 – 10 days.

COMPLICATIONS OF UNRECOGNIZED BLADDER AND BLADDER NECK INJURIES

1. Fever, sepsis, acidosis, azotemia.
2. Peritonitis, ileus, urinary ascities.
3. Low urine output.
4. Incontinence.
5. Fistula and stricture.

URETHRAL INJURIES

POSTERIOR URETHRA

Urethral injuries are most commonly due to road traffic accidents, accidental fall and associated pelvic fractures. Straddle injury and pelvic instability are high risk for urethral injury. Posterior urethra is fixed and anterior urethra is freely mobile and hence bulbo membranous junction is more vulnerable to injury.

DIAGNOSIS

Blood at the meatus, retention of the urine and palpable bladders are the triad of findings in urethral injury. In females vulval edema and blood at the vaginal introitus along with pelvic fracture.

CLASSIFICATION

Most common classification is described by Colapinto and McCallum by using radiological findings.

Type 1. Rupture of puboprostatic ligaments and surrounding periprostatic hematoma stretch the membranous urethra without rupture.

Type 2. Partial or complete rupture of the membranous urethra above the urogenital diaphragm. On urethrography, contrast material is seen extravasating above the urogenital diaphragm into the pelvis.

Type 3. Partial or complete rupture of membranous urethra with disruption of the urogenital diaphragm. Contrast extravasates both into the pelvis and perineum.

Type 4. Bladder neck injury with extension into the urethra.

Type 5. Pure anterior urethral injury.

Type 1 & 2 are uncommon. Type 3 is more common. Type 4 is rare.

URETHROGRAPHY

A small bore urethral catheter is placed in the fossa navicularis and balloon filled with 1 cm of water or rolled gauze bandage can be used to provide penile traction to achieve a snug fit of the catheter. Patient should be placed in an oblique or lateral decubitus position. The thigh closer to the table is 90 degree flexed and

25 ml of contrast is injected and the film is to be taken during contrast injection. Smooth and continuous contour will be seen in normal urethra which is altered in urethral injury.

INITIAL MANAGEMENT

One gentle attempt to place a Foley's catheter, if not possible Suprapubic cystostomy is the immediate management.

SUPRAPUBIC CYSTOSTOMY

Trocar SPC when there is no other indication for surgery in full bladder or open SPC through an small infra umbilical incision and proper placement of catheter.

PRIMARY REALIGNMENT

It is done in stable patients who had an another indication for surgery. It is associated with impotence and incontinence. It is important to retain supra pubic catheter because most patients will develop stricture following realignment. Urethral catheter can be removed after 4 – 6 weeks. If the patient voids through urethra satisfactorily SPC can be removed 7 – 14 days later.

In case of females immediate primary repair over a catheter to avoid subsequent urethra vaginal fistula or urethral stricture. Delayed reconstruction is difficult in female urethra which is too short.

DELAYED RECONSTRUCTION

At three months, scar tissue at the urethral disruption site is stable enough to do posterior urethroplasty provided that the associated injuries are stable and the patient is ambulant. SPC tube is maintained until the associated injuries become stable.

PREOPERATIVE EVALUATION

A cystogram and retrograde urethrogram should be obtained simultaneously this enables the extent of urethral injury.

ENDOSCOPIC TREATMENT

For defects <1 cm, direct vision internal urethrotomy is the best procedure of choice. In case of defects > 1 cm, complications such as false passage, long term dilatation and multiple urethrotomies are more common.

SURGICAL RECONSTRUCTION

Open posterior urethroplasty through perineal approach is the treatment of choice without the need for multiple procedures. In lithotomy position a midline or Lambda shaped incision is made, bulbar urethra and prostatic urethra are mobilized from the injured site, scar tissue is excised until 28-F bougie is passed without resistance through the proximal urethra.Then end to end anastomosis is made without tension over the Foley's catheter. Other maneuvers

1. Corporal separation.
2. Inferior pubectomy.
3. Corporal rerouting.
4. Abdomino pelvic approach.

COMPLICATIONS

1. Impotence.
2. Incontinence.
3. Stricture.

ANTERIOR URETHRA

It is often occurs as isolated injuries after straddle injury which involves bulbar urethra. It also occurs in penile fracture, foreign body injuries and iatrogenic injuries.

DIAGNOSIS

1. Blood at the meatus.
2. Perineal hematoma.
3. Urinary retention.
4. Butterfly sign. If bucks fascia is disturbed.
5. Retrograde urethrogram.

CLASSIFICATION

Most widely used classification is described by McAninch and Armenakas based on the radiological findings.

1. Contusion – retrograde urethrography normal.
2. Incomplete disruption – urethrography demonstrates extravasation but urethral continuity is partially maintained.
3. Complete disruption – urethrography demonstrates extravasation with absent filling of proximal urethra.

MANAGEMENT

1. Contusion and incomplete disruption can be treated with catheterization.
2. SPC is the treatment of choice for complete disruption.
3. Primary surgical repair – With limited debridement.
4. Delayed reconstruction – proximal and distal urethra can be mobilized and tension free end to end anastomosis.
5. Partial urethral narrowing can be treated by endoscopic urethrotomy.

INJURIES TO THE EXTERNAL GENITALIA

Traumatic injuries to the external genitalia are uncommon because of the mobility of the penis and scrotum.

PENILE FRACTURE

Penile fracture is the disruption of the tunica albuginea with rupture of corpus cavernosum due to blunt phallic injury to the erect penis, sexual intercourse and masturbation. The tensile strength of the tunica albuginea is resisting rupture until intercavernous pressure rises > 1500 mmHg. Usually the site of rupture is distal to the suspensory ligament and the tunical tear is transverse. Associated urethral injury is rare.

GRADING

American association for the surgery of trauma described a grade for Penile injury.

GRADING OF PENILE INJURY

GRADE	PENILE INJURY
I	Cutaneous Laceration or contusion
II	Laceration of buck's fascia without tissue loss
III	Cutaneous avulsion, laceration through glans or meatus, or cavernosal or urethral defect < 2 cm
IV	Partial penectomy or cavernosal or urethral defect ≥ 2cm
V	Total penectomy

DIAGNOSIS AND IMAGING

1. Cracking or popping sound during sexual intercourse followed by pain, rapid detumescence, discoloration and swelling of the penile shaft.
2. If the Buck's fascia is intact, hematoma is contained and resulting in eggplant deformity.
3. If the Buck's fascia is disturbed, hematoma can extend up to the scrotum, perineum and supra pubic regions.

4. Rolling sign – firm, mobile, discrete tender swelling over which the penile skin can be rolled.
5. Cavernosography assists in diagnosis but false negative studies have been reported.
6. Magnetic resonance imaging is accurate in demonstrating disruption of the tunica albuginea but it is expensive, time consuming and limited availability, it is not routinely used.

MANAGEMENT

Distal circumcising incision provides exposure of all three penile compartments followed by skin retraction and closure of the tunical defect with interrupted absorbable sutures. Excessive debridement should be avoided. Antibiotics and one month of sexual abstinence are recommended. Those patients undergoing repair within 8 hrs of injury had better results.

COMPLICATIONS

1. Abscess.

2. Penile curvature.

3. Longer hospitalization in delayed repair.

GUNSHOT AND PENETRATING INJURIES

These injuries are most commonly associated with urethral injury.

Urethral injury is closed primarily by standard urethroplasty principles.

ANIMAL AND HUMAN BITES

Animal bites are most commonly due to dogs and victims are boys. Managed by primary closure along with antibiotics and rabies immunization. Human bites produce contaminated wounds, should not be closed primarily.

AMPUTATION

Self mutilation by psychiatric patients is more common. Reconstruction of urethra and reanastomosis of corpora cavernosa along with microsurgical repair achieves good results. In thermal injuries re-implantation is possible after 16 hrs of cold ischemia and 6 hrs of warm ischemia.

COMPLICATIONS

a. Urethral stricture.

b. Skin loss.

c. Sensory abnormalities. These are more common in macroscopic repair.

ZIPPER INJURIES

It usually occurs in boys and intoxicated adults. After a penile block the zipper sliding piece and the adjacent skin can be lubricated followed by unzip. The cloth material connected to the zip is incised and it allow the device to fall apart and release the trapped skin. A bone cutter is used to cut the median bar of the sliding piece. It allows the separation of upper and lower shields of the sliding piece. Otherwise elliptical skin incision can be performed under anesthesia.

STRANGULATION INJURIES

Accidental injury is caused by hair, thread and rubber bands in children and for sexual pleasure in adults. This can be managed by incising the materials. Constricting devices may produce edema and induce ischemia gangrene and urethral injury. This can be managed by lubrication of the penis and foreign body followed by its direct removal. If distal edema is present, a tourniquet can be wrapped around the distal shaft. It aids its removal by reducing the swelling. If this method fails a string technique should be considered. A silk suture or umbilical tape is passed proximally under the object and wrapped distally. The tape proximal to the ring is grasped and unwinding from the proximal end will push the objects distally. Glandular puncture will allow escape of edema fluid and aids in the removal of foreign body.

TESTICULAR INJURY

Testicular injury is rare because it is protected by mobility of the scrotum, reflex cremastric muscle contraction and its tough fibrous tunica albuginea. Penetrating and blunt trauma are most common cause for testicular injury.

DIAGNOSIS

1. Scrotal pain, nausea, scrotal swelling and ecchymosis.
2. Ultrasonography is helpful in assessing the integrity and vascularity of the testis. The findings suggestive of testicular rupture are in homogeneity of the testicular parenchyma and disruption of the tunica albuginea.
3. A non palpable testis should raise the possibility of dislocation outside the scrotum or into the surrounding tissues.

MANAGEMENT

Minor injuries can be managed with ice, elevation, analgesics and irrigation. Early exploration and repair with in 3 days of testicular injury is associated with increased testicular salvage rate. The objectives of surgical exploration are testis salvage, prevention of infection, hemostasis and preservation of fertility. Even small defects in tunica albuginea should be closed. If there is a loss of capsule, it

may require removal of additional parenchyma to allow closure of the remaining tunica albuginea. Delayed repair increases the orchidectomy rate.

COMPLICATIONS

1. Hematocele, pressure necrosis and testicular atrophy.

2. Wound infection and pyocele.

SCROTAL INJURY

Most commonly due to blunt injury, machinery accidents and stab wounds.

GRADING

American association for the surgery of trauma described the grading system.

GRADING OF SCROTAL INJURY

GRADE	SCROTAL INJURY
1	CONTUSION
2	LACERATION <25% OF SCROTAL DIAMETER
3	LACERATION =25%OF SCROTAL DIAMETER
4	AVULSION <50%
5	AVULSION = 50%

MANAGEMENT

Scrotal laceration can be closed primarily in the absence of gross infection along with hemostasis, drain and scrotal support.

GENITAL SKIN LOSS

Necrotizing gangrene due to polymicrobial infection or Fournier's gangrene is the common cause of extensive genital skin loss. Penile skin loss can result from traction by mechanical devices.

DIAGNOSIS

1. Genital edema, erythema, skin ischemia are the evidence of Fournier's gangrene.
2. Scrotal ultrasound and CT reveals subcutaneous air which is a helpful indicator of necrotizing infection.

MANAGEMENT

Urinary drainage along with wet dressing and surgical debridement until active infections controlled.

PENILE RECONSTRUCTION

In uncircumcised patients mobilization of redundant foreskin allows primary closure of distal penile skin loss. Scrotal rotational flaps and local flaps from abdomen and thigh can also be used.

Thick, non meshed split thickness skin grafts are preferred for extensive penile skin loss. Meshed grafts may contract and cosmetically less acceptable. If grafts are used, lymphatic obstruction of the distal foreskin leads to lymph edema. It is prevented by excision of foreskin. Complete penile skin loss is managed by bury it in the scrotum leaving the glans exposed with separation of structures after two months.

SCROTAL RECONSTRUCTION

Scrotal skin loss up to 50% can be closed primarily. For extensive injuries the testis may be placed in the thigh pouches or with wet dressing for several weeks until reconstruction.

Meshed split thickness grafts are used in scrotal reconstruction. The spermatic cords are sewn together before grafting to prevent bifid neoscrotum. The testis serves as natural tissue expander. Local flaps can be used for reconstruction. Fibrin sealant is useful in healing.

METHODS OF HEALING IN THE URINARY TRACT

Renal tubular epithelium has extensive powers of regeneration. When nephrons or glomeruli are destroyed, degeneration doesn't occurs. Healing occurs primarily by fibrosis. Kidney, though it is a cellular organ it has well developed fibrous capsule. Hence repair of wounds is easier than liver and spleen.

Partial and subtotal nephrectomy is the preferred method to salvage the kidney according to the segments involved in injury. If the injury is too extensive then the available treatment is total nephrectomy followed by hypertrophy of the remaining kidney. Maximum levels of mitosis and epithelial proliferation occurs within 48 hours of nephrectomy. Wound contraction is the prominent feature in the healing of collecting system.

Prevention of stenosis and consideration of blood supply must always be the primary aim of treatment. When compared to renal pelvis which is very rich in blood supply, ureteric blood supply is precarious. Urinary leakage promotes fibrosis and cicatrisation. Urinary tract anastomotic procedures require diversion. Mucosal regeneration of urothelium is rapid. The regenerating capacity of transitional epithelium begins within 24 hours of injury. The regenerating tissues

often form crypts like down growths. The repair process is rapid than that of bowel and skin wounds.

The bladder achieves 95% of its original strength within 10 days and almost 100% after 14 days. Therefore bladder wounds need to be supported for 7-10 days. The voiding and bladder capacity are not significantly altered. Urethral capacity for regeneration is made use in the resurfacing of prostatic urethra after prostatectomy. Loss of some portion of its epithelium results in fibrosis, which is aggravated by urinary leak. Hence proximal urinary diversion is advocated along with accurate mucosal approximation, free drainage of the wound and antibiotics.

MATERIALS AND METHODS

MATERIALS AND METHODS

Sample size : 30 cases

Study design : Observational study (Prospective & Retrospective)

Study population : 30 cases

Study period : Oct 2016 to Sep 2017

Study centre : Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai

Subject selection :

Inclusion Criteria :

All trauma victims sustaining blunt and penetrating trauma to the genitourinary system with or without associated injuries.

Exclusion Criteria:

1. Abdominal trauma to all visceral and solid organs without injury to the genitourinary organs.
2. All children less than 13 years of age.

ASSESSMENT OF PARAMETERS :

All patients who fit the inclusion criteria were observed and following data collected

1. Routine blood investigations

-Hemoglobin

-Hematocrit

-Renal function test

All these will be done serially

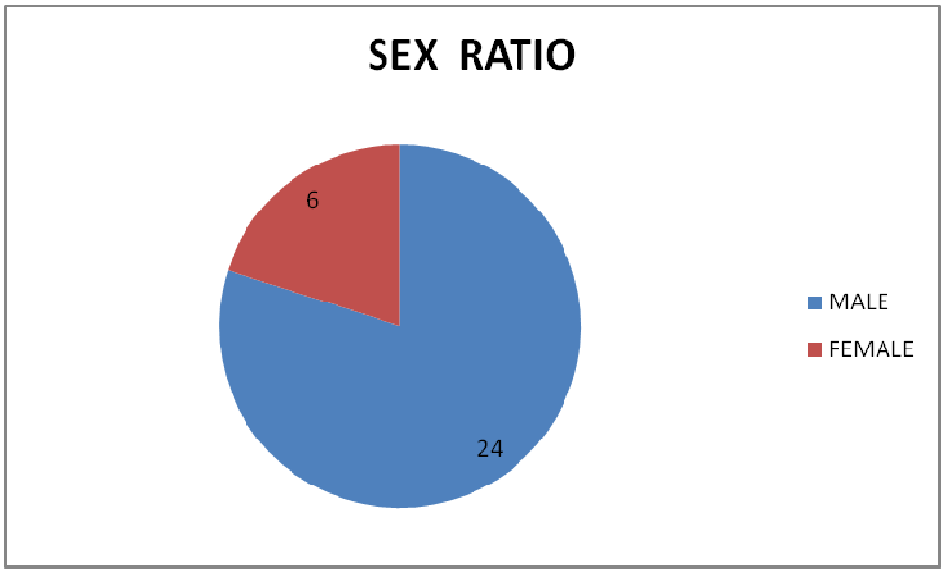
2. FAST
3. CECT Abdomen and Pelvis/KUB (i.v. contrast) for all cases, CT cystogram with delayed films and CT Pelvis in some cases
4. AAST grading system will be the standard methodology to assess severity of kidney injury

5. Patients managed conservatively will be followed up prospectively and till discharge and further
6. Specialist opinion like vascular, urology and surgical gastroenterology and orthopedics

All collected data will be analysed and conclusions derived

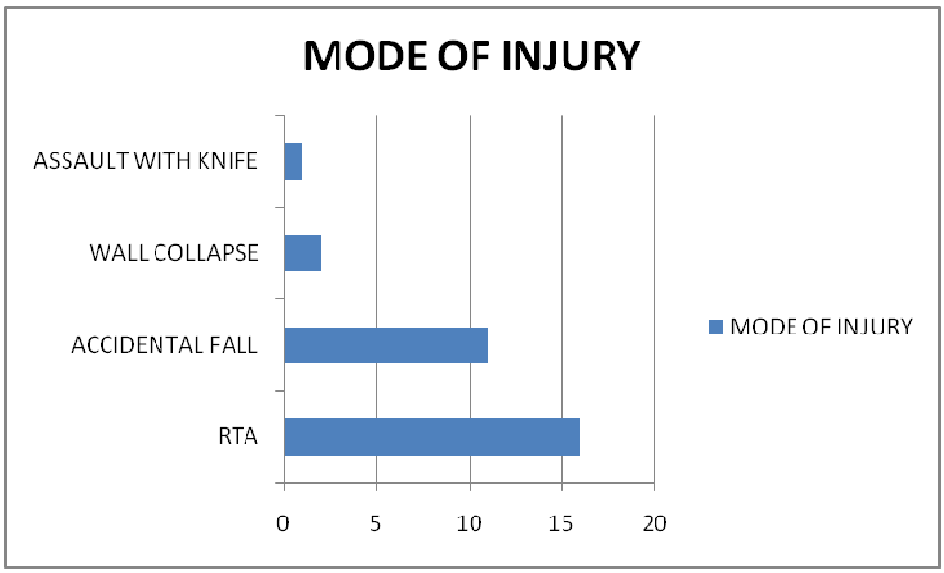
DATA ANALYSIS AND RESULTS

OVERALL SEX RATIO



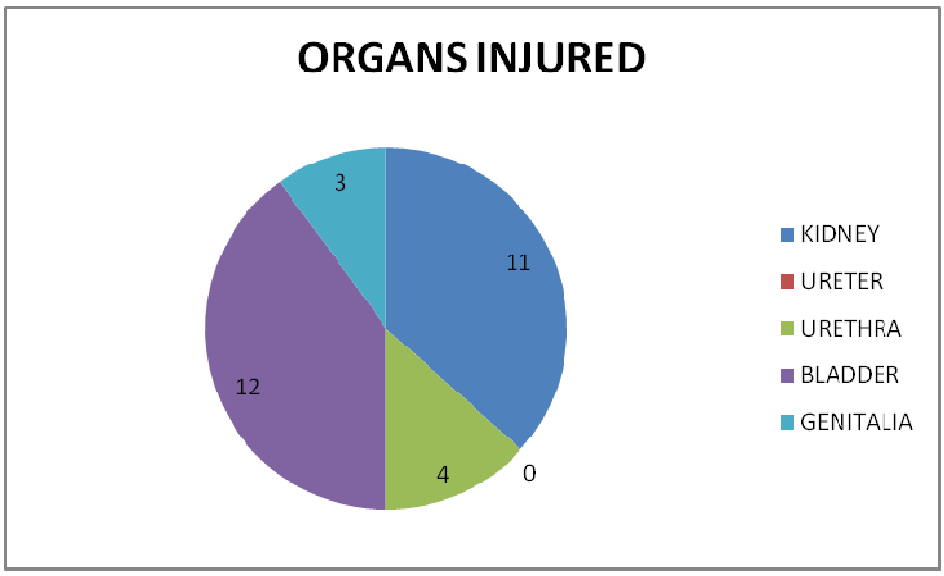
In our study , in a total population of 30 patients, 24 (80%) were males and 6 (20%) were females.

MODE OF INJURY



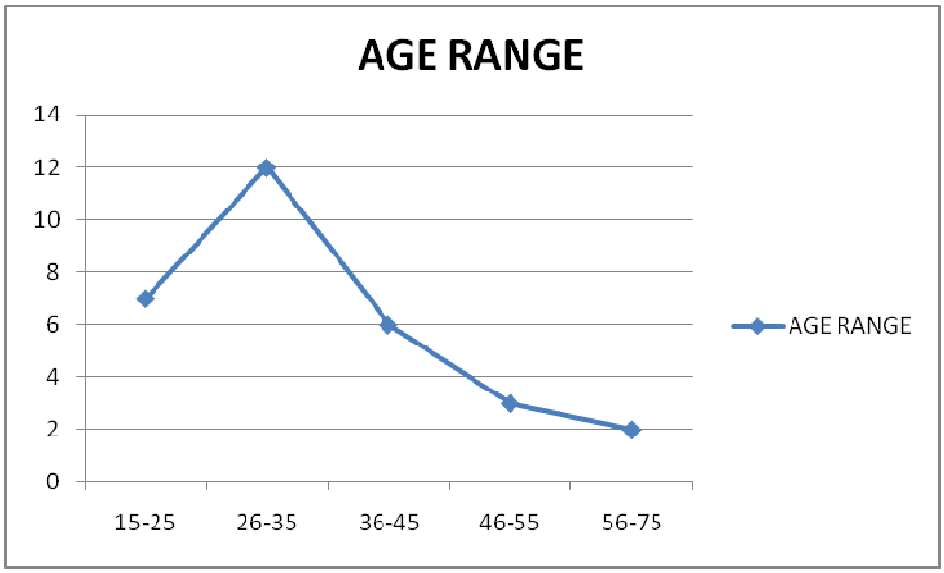
Out of 30 patients in our study , 16 were due to road traffic accidents (RTA) (53.3%), 11 due to accidental fall (36.6%), 2 due to wall collapse (6.66%) and one due to assault with knife (3.33)

ORGANS INJURED

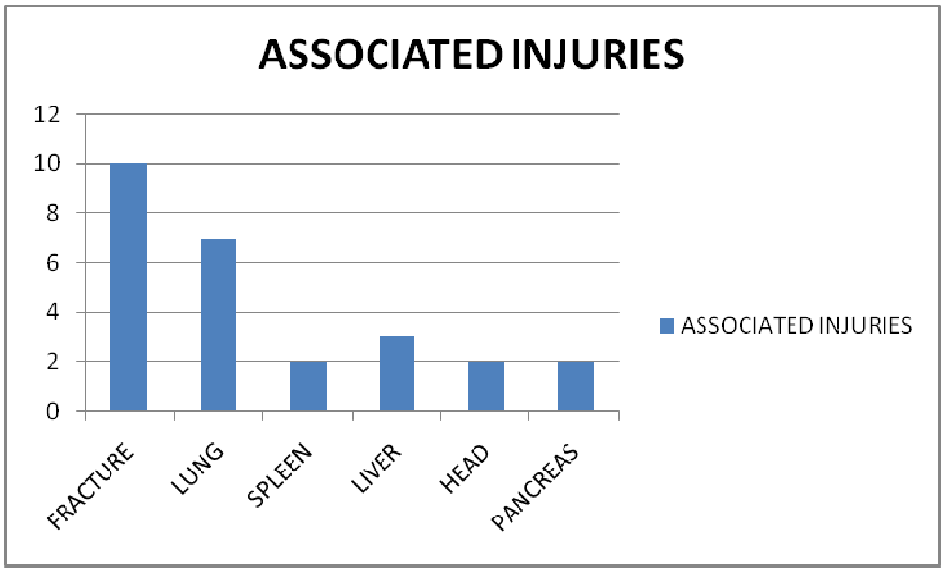


Bladder is the most common organ injured (40%) in about 12 patients and the next organ is kidney in about 11 patients (36.6). Urethra wa injured in about 4 patients (13.3%) and genitalia in about 3 (10%). No cases of ureter injury in the study sample.

AGE RANGE



ASSOCIATED INJURIES



FRACTURES

The most common associated injuries in genitourinary trauma are fractures especially pelvic fractures.

The most common pelvic fracture is inferior pubic ramus fracture .

D12 burst fracture in one case and transverse process of L5 in another case has been observed.

LUNG

- Lung injury was present in about 7 patients.
- Most common lung injury is Left Pneumothorax in about 3 patients
- Bilateral hemothorax - 1 case
- Lung contusion-1 case
- Rib fracture-1 case

LIVER

- Liver injury was present in 3 cases.
- Grade 2,3 and 4 in each case

SPLEEN

- Splenic injury was present in 2 cases.

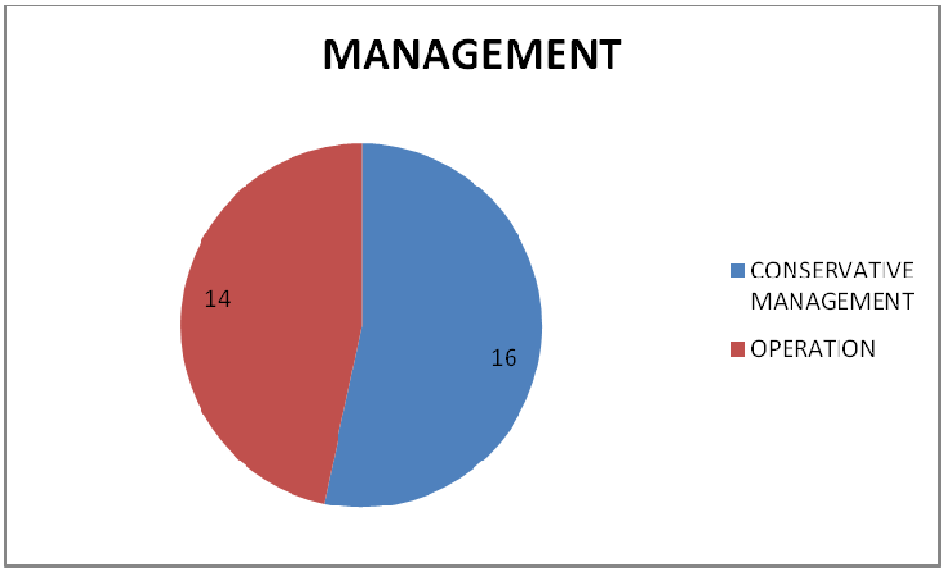
HEAD

- Head injury was present in 2 cases.
- Both were thin SDH managed conservatively

PANCREAS

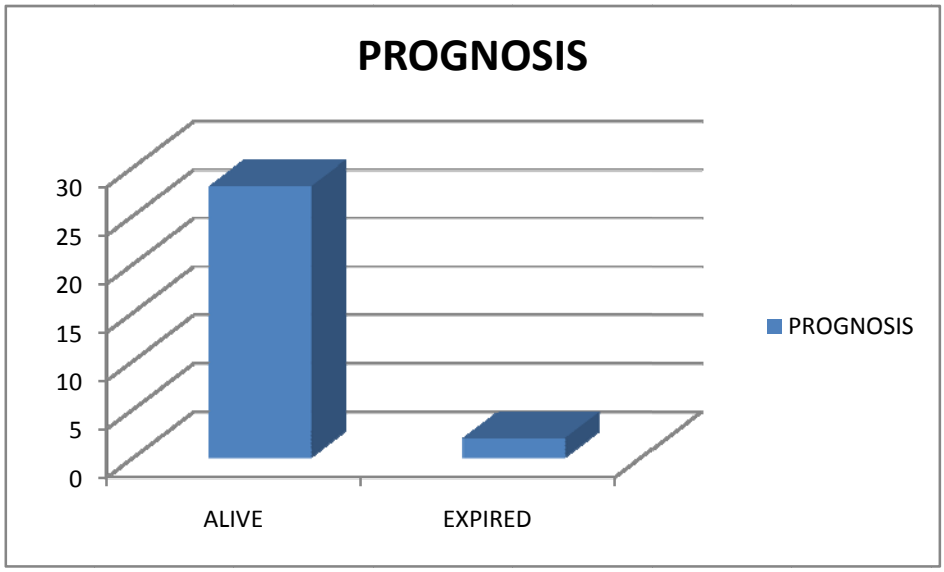
- Distal pancreatic disruption was present in 2 cases.

MANAGEMENT



Of the 30 patients with genitourinary trauma, 16 were managed conservatively (53.33%) and 14 were operated (46.66%)

PROGNOSIS



Of the 30 patients who had genitourinary trauma 28 survived (93.33%) and 2 patients expired (6.66%)

RENAL INJURY

SEX	COUNT	PERCENTAGE
MALE	8	72.7%
FEMALE	3	27.27%

Out of 30 patients,11 had injury to kidney (36.6%).Among them 8 were males(72.71%) and 3 were females(27.27%).

MODE OF INJURY	COUNT	PERCENTAGE
RTA	8	72.72%
ACCIDENTAL FALL	2	18.18%
WALL COLLAPSE	1	9.09%
IATROGENIC	0	0
ASSAULT WITH KNIFE	0	0

Road Traffic Accident was the most common mode of injury in patients with renal injury i.e 8 patients (72.72%) followed by accidental fall in about 2 patients (18.18%) and wall collapse in 1 patient (9.09%).

MANAGEMENT	COUNT	PERCENTAGE
CONSERVATIVE MANAGEMENT	9	81.81%
OPERATION	2	18.18%

All the patients were received in our emergency trauma ward. Basic investigations along with FAST, CECT abdomen and pelvis and CT cystogram with delayed films done for all patients. Out of 11 patients with renal injury, 9 were managed conservatively (81.81%).

Only 2 patients were taken for emergency surgery. Both the patients had distal pancreatic injury . 1 patient had grade -3 renal injury and another patient had grade-4 renal injury. Both were taken for emergency laparotomy and proceeded with left nephrectomy, distal pancreatectomy with splenectomy with the help of SGE and Urology team. Post operative period was uneventful. The most common associated injury with renal trauma is injury to lungs.

PROGNOSIS	**COUNT**	**PERCENTAGE**
ALIVE	9	81.81%
EXPIRED	2	18.18%

Out of 11 patients, 2 expired (18.18%). Both were hemodynamically unstable at the time of admission and was resuscitated with i.v fluids and blood products . both had multiple associated injuriesand expired within 24hrs of admission

BLADDER INJURY

SEX	COUNT	PERCENTAGE
MALE	9	75%
FEMALE	3	25%

In our study bladder is the most common organ to be injured in about 12 patients out of 30 (40%). Out of 12 patients, 9 were male (75%) and 3 were female (25%).

MODE OF INJURY	COUNT	PERCENTAGE
RTA	6	50%
ACCIDENTAL FALL	4	33.33%
WALL COLLAPSE	1	8.33%
ASSAULT WITH KNIFE	1	8.33%

Road Traffic Accident was the mode of injury in about 6 patients (50%) followed by Accidental Fall in 4 patients (33.33%),Wall collapse in 1 patient (8.333%) and Assault with knife in 1 patient (8.33%).

MANAGEMENT	COUNT	PERCENTAGE
CONSERVATIVE MANAGEMENT	3	25%
OPERATION	9	75%

Out of 12 patients, 9 had intraperitoneal bladder injury (75%). All 9 patients were subjected to basic investigations and CT cystourethrogram with delayed films. All 9 patients were taken for emergency laprotomy and primary bladder repair with supra pubic cystostomy.

3 patients (25%) had extra peritoneal bladder injury. All 3 were managed conservatively and discharged. The most common associated trauma with bladder injury is pelvic fracture.

PROGNOSIS	COUNT	PERCENTAGE
ALIVE	12	100%
EXPIRED	0	0%

All patients were discharged with the mean hospital stay of 15 days.

URETHRAL INJURY

SEX	COUNT	PERCENTAGE
MALE	4	100%
FEMALE	0	0%

Out of 30 patients 4, had urethral injury (13.3%). All 4 patients were males (100%).

MODE OF INJURY	COUNT	PERCENTAGE
RTA	0	0%
ACCIDENTAL FALL	4	100%
WALL COLLAPSE	0	0%
IATROGENIC	0	0%
ASSAULT WITH KNIFE	0	0%

All the injuries were due to Accidental Fall.

MANAGEMENT	COUNT	PERCENTAGE
CONSERVATIVE MANAGEMENT	4	100%
OPERATION	0	0%

All 4 presented with hematuria and subjected to CT Cystrourithrogram with delayed films and found to have membranous urethra rupture. All of them were managed conservatively by gentle catheterization.

Out of 4 patients with urethral injury 2 were associated with pelvic fracture.

PROGNOSIS	COUNT	PERCENTAGE
ALIVE	4	100%
EXPIRED	0	0%

All patients were discharged with the mean hospital stay of 14 days.

GENETALIA

SEX	COUNT	PERCENTAGE
MALE	3	100%
FEMALE	0	0%

Out of 30 patients, only 3 were had injury to Genetalia. All 3 were men.

MODE OF INJURY	COUNT	PERCENTAGE
RTA	2	66.66%
ACCIDENTAL FALL	1	33.33%
WALL COLLAPSE	0	0%
IATROGENIC	0	0%
ASSAULT WITH KNIFE	0	0%

Out of 3 patients, 2 had RTA (66.66%) and 1 wad due to Accidental fall (33.33%)

MANAGEMENT	COUNT	PERCENTAGE
CONSERVATIVE MANAGEMENT	0	0%
OPERATION	3	100%

All 3 patients were operated. One of the patient had injury scrotum exposing the testis. He underwent left orchidectomy with implantation of right testis in right thigh pouch.

PROGNOSIS	COUNT	PERCENTAGE
ALIVE	3	100%
EXPIRED	0	0%

DISCUSSION

DISCUSSION

The current study includes, the observation made in 30 cases of Genitourinary trauma patients admitted in our hospital.

AGE DISTRIBUTION

AGE RANGE	AGE RANGE	PERCENTAGE
15-25	7	23.33%
26-35	12	40%
36-45	6	20%
46-55	3	10%
56-75	2	6.66%

In our study, 7 cases were in the age group of 15 – 25 years which accounts for 23.33% of cases, 12 cases were in the age group of 26 – 35 years which accounts for 40% of cases, 6 cases were in the age group of 36 – 45 years and accounts for 20% of cases, 3 cases were in the age group of 46-55 years which accounts for 10% of cases and , 2 cases were in the age group of 56-75 years which accounts for 6.66% of cases.

The male and female ratio was 24: 6 i.e., 80% of cases were male and 20% of cases were female. The increased incidence of male is probably due to the outdoor nature of their occupation and aggressive behavior in male. The age distribution shows that males of age between 26– 35 years exhibit maximal number of cases, which is most commonly due to Road traffic accidents and accounts for 53.3% of cases. Followed by Accidental fall which accounts for 36.66% of cases and Wall collapse this accounts for 6.66% of cases.

Regarding the organs injured in the genitourinary system, bladder is the most commonly injured organ, this accounts for 40% of cases followed by kidney, Urethra and Genitalia which accounts for 36.3%, 13.3%, 10% respectively.

In this study, all the cases were admitted in our hospital emergency ward within 24 hours of injury. At the time of admission only six cases were hemodynamically unstable, this accounts for 20% of cases. They were managed by resuscitation . These unstable patients were associated with other visceral organ injury and Fractures. The hemodynamically stable patients accounts for 80% of cases.

Regarding renal injuries penetrating injury is more dangerous than blunt injury. Hematuria is most common presentation along with peritonitis and hemodynamic instability. Decision to operate is mainly based on clinical signs, X rays, ultrasound and CT scan. CT scan study is most commonly used for diagnosis

and contrast CT is to observe the patients those managed conservatively. Our foremost aim in surgery for renal trauma is to preserve as much as renal tissue as possible. Nephrectomy rate in our study was 18.18%.

No case of ureteric injury was found in the study group. But most uretric injuries are due to iatrogenic trauma most commonly during gynecological procedures.

When compared to upper urinary tract injuries lower urinary tract injury is most common due to road traffic accidents which are most commonly associated with pelvic bone fractures. Cystogram is most valuable in diagnosing bladder injury followed by CT cystogram which demonstrates site, size and displacement of the bladder resulting from pelvic hematoma. Closure of the bladder wall with plain catgut or polyglycolic acid suture material will avoid the risk of phosphate encrustation. In urethral injuries diagnostic catheterization is strongly condemned except single gentle catheterization. Retrograde urethrogram is the safest and simplest procedure to provide a diagnosis of urethral injury. With the development of end viewing endoscope, the approach to investigating rupture of urethra has been completely changed.

Turner and Wardwick recommend complete excision of para urethral fibrosis in initial reconstruction procedures. Opinion differs on the relative merits

of repeated urethral dilatation or urethroplasty in the management of urethral strictures.

Genital injuries are rare due to its mobility and are most commonly due to RTA followed by Accidental fall in our study.

CONCLUSION

CONCLUSION

a. The most common cause of genitourinary tract injury is due to road traffic accident.

b. Similar to many large series males are more often affected by road traffic accident than females due to their outdoor nature of work.

c. Middle aged patients are the victims when compared to either extremes of age.

d. Most common injury to the genitourinary system is lower urinary tract injury. Among these, bladder injury is most common and it is commonly associated with pelvic bone fracture.

e. Hemodynamically unstable patients are most commonly associated with other intra abdominal visceral organ or pelvic fractures. Early resuscitation and laparotomy along with methodical exploratory technique is essential for penetrating injuries and blunt injuries.

f. Renal injuries can be managed conservatively unless associated with other injuries.

g. Investigations such as X rays and blood tests are only complimentary to clinical examination.

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REFERENCES

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PATIENT PROFORMA

PATIENT DETAILS:

- Name: Age: Sex:
- IP No. :

ON ADMISSION:

- MAIN COMPLAINTS:
- MODE OF INJURY:
- ASSOCIATED COMPLAINTS :

CLINICAL EXAMINATION:

- Pulse : BP :
- RR : Temp :
- Pallor : Icterus :
- CVS : RS :
- P/A : CNS:

LIST OF INJURIES :

INVESTIGATIONS :

CBC/RFT				
TC				
DC				
Hb%				
PCV				
RBC				
Platelets				
Glucose				
Urea				
Creatinine				
$Na^{+/}K^{+}$				

LFT				
Total Bili				
Dir.Bili				
SGOT				
SGPT				
Total Protein				
Sr.Albumin				

CXR :

Abdomen X ray :

FAST:

CECT Abdomen & Pelvis/ KUB/CT cystogram:

TREATMENT

CONSERVATIVE MANAGEMENT WITH DAILY FOLLOW UP

OPERATIVE MANAGEMENT :

Indication :

Intra Op findings :

Post op Period :

FOLLOW UP :

ANNEXURE

INFORMATION SHEET

TITLE:

"A COMPREHENSIVE STUDY ON GENITOURINARY TRAUMA IN RGGGH"

Name of Investigator : **Dr.A.S.Mokan Raj.**

Name of Participant:

Purpose of Research: To highlight the importance of conservative management and operative intervention involving multidisciplinary approach

Study Design **:** Prospective and retrospective observational Study

Study Procedures : Patient will be subjected to routine investigations, Xray, FAST, CECT abdomen and pelvis / KUB / CT Cystogram / CT / Pelvis Operative Procedures as indicated, if done and the data analysis. as indicated, and the data analysed

Possible Risks **:** No risks to the patient

Possible benefits

To patient : A better understanding of their problem so has to devise a plan of management which suits their needs.

To doctor & to other people: If this study gives positive results, it can help determine the early identification, most effective diagnostic and treatment

protocol for patients with genitourinary trauma. This will help in providing better and complete treatment to other patients in future..

Confidentiality of the information obtained from you: The privacy of the patients in the research will be maintained throughout the study. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared

Can you decide to stop participating in the study: Taking part in this study is voluntary. You are free to decide whether to participate in this study or to withdraw at any time

How will your decision to not participate in the study affect you: Your decision will not result in any loss of benefits to which you are otherwise entitled.

Signature of Investigator Signature of Participant

PATIENT CONSENT FORM

Study Detail : ***"A COMPREHENSIVE STUDY ON GENITOURINARY TRAUMA IN RGGGH"***

Study Centre : Rajiv Gandhi Government General Hospital, Chennai.

Patient's Name :

Patient's Age :

Patient may check (☑) these boxes

I confirm that I have understood the purpose of procedure for the above study. I have the opportunity to ask question and all my questions and doubts have been answered to my complete satisfaction. ❑

I understand that my participation in the study is voluntary and that I am free to withdraw at any time without giving reason, without my legal rights being affected. ❑

I understand that sponsor of the clinical study, others working on the sponsor's behalf, the Ethics committee and the regulatory authorities will not need my permission to look at my health records, both in respect of current study and any further research that may be conducted in relation to it, even if I withdraw from the study I agree to this access. However, I understand that my identity will not be revealeds in any information released to third parties or published, unless as required under the law. I agree not to restrict the use of any data or results that arise from this study.

❑

I agree to take part in the above study and to comply with the instructions given during the study and faithfully cooperate with the study team and to immediately inform the study staff if I suffer from any deterioration in my health or well being or any unexpected or unusual symptoms. ❑

I hereby consent to participate in this study ❑

I hereby give permission to undergo complete clinical examination and diagnostic tests including hematological, biochemical, radiological tests and to undergo treatment ❑

Signature/thumb impression

Signature of Investigator

Patient's Name :

Study Investigator's Name: **Dr.A.S.Mokan Raj**

SNO	NAME	AGE	SEX	IP N0.	COMPLAINTS	MODE OF INJURY	PER ABDOMEN	PULSE	BP	ASSCOIATED INJURIES	USG ABDOMEN	CECT ABD/PLAIN CT/CT KUB WITH	RFT	CBC	KIDNEY	URETER	BLADDER	URETHRA	GENITALIA	MANAGEMENT	FOLLOW UP
1	SATHISH	19	MALE	101139	PAIN LOWER ABDOMEN	RTA 2 WHEELER VS 4 WHEELER	DIFFUSE GUARDING RIGIDITY	108	100/70	NIL	FREE FLUID ABDOMEN	INTRAPERITONEAL BLADDER RUPTURE	RBS-119,UREA-22,CR-1.2,NA-147,K-2.9	HB-12.2,HCT-33.4,PLT-211000,WBC-18200	N	N	Y	N	N	LAPAROTOMY AND PRIMARY BLADDER REPAIR WITH SPC	PATIENT DISCHARGED ON 14 TH HOSPITAL DAY WITHOUT ANY COMPLICATIONS
2	GOVINDAMMAL	37	FEMALE	98951	DIFFUSE ABDOMEN PAIN WITH HEMATURIA	WALL COLLAPSE	DIFFUSE GUARDING	110	90/70	1.RIGHT LUNG CONTUSION 2.RIGHT INFERIOR PUBIC RAMUS FRACTURE	RIGHT RENAL INJURY	GRADE 4 RIGHT RENAL INJURY WITH PERINEPHRIC HEMATOMA	RBS-99,UREA-32,CR-1.2,NA-137,K-2.8	HB-10,HCT-32,PLT-109000,WBC-9400	Y	N	N	N	N	CONSERVATIVE MANAGEMENT	PATIENT DISCHARGED ON 25 TH HOSPITAL DAY WITHOUT ANY COMPLICATIONS
3	RATHINAVEL	27	MALE	91507	DIFFUSE ABDOMEN PAIN	ACCIDENTAL FALL	DIFFUSE TENDERNESS AND GUARDING ALL OVER ABDOMEN	102	110/60	GRADE 3 SPLENIC LACERATION	FREE FLUID ABDOMEN	NON ENHANCING LEFT KIDNEY	RBS-223,UREA-23,CR-1.1,K-3.6	HB-9.8,HCT-27.4,PLT-82000,WBC-4900	Y	N	N	N	N	CONSERVATIVE MANAGEMENT	PATIENT DISCHARGED ON 17TH HOSPITAL DAY WITHOUT COMPICATIONS
4	RAVI KUTTY	40	MALE	87032	PAIN ABDOMEN WITH HEMATURIA	ACCIDENTAL FALL	TENDERNESS AND GUARDING IN RIGHT UPPER ABDOMEN	92	140/90	1.GRADE 2 LIVER INJURY 2.D12 BURST FRACTURE 3.RIGHT PNEUMOTHORAX WITH 8TH TO 12TH RIB FRACTURE	FREE FLUID ABDOMEN	GRADE 3 RIGHT RENAL INJURY	RBS-185,UREA-46,CR-1.4,NA-140,K-2.6	HB-11.0,HCT-28.7,PLT-28000,WBC-62000	Y	N	N	N	N	CONSERVATIVE MANAGEMENT	PATIENT DISCHARGED ON 27TH HOSPITAL DAY WITHOUT COMPICATIONS
5	SRINIVASAN	35	MALE	63395	PAIN ABDOMEN	WALL COLLAPSE	DIFFUSE TENDERNESS	98	130/70	NIL	FREE FLUID ABDOMEN	INTRAPERITONEAL BLADDER RUPTURE	RBS-145,UREA-36,CR-0.6,NA-139,K-3.6	HB-11.0,HCT-32.7,PLT-128000,WBC-12000	N	N	Y	N	N	LAPAROTOMY AND PRIMARY BLADDER REPAIR WITH SPC	PATIENT DISCHARGED ON 19TH HOSPITAL DAY WITHOUT COMPICATIONS
6	ALTHAF BEGUM	34	FEMALE	58381	PAIN ABDOMEN	RTA PEDASTRIAN VS FOUR WHEELER	DIFFUSE TENDERNESS WITH GUARDING IN LOWER ABDOMEN	110	90/60	1.LEFT PUBIC BONE FRACTURE AND RIGHT ALA OF SACRUM FRACTURE 2.TRANSVERSE PROCESS OF L5 FRACTURE 3.THIN FRONTAL SDH.	FREE FLUID ABDOMEN	INTRAPERITONEAL BLADDER RUPTURE	RBS-215,UREA-30,CR-1.1,NA-131,K-4.1	HB-3.5,HCT-8.9,PLT-52000,WBC-3700	N	N	Y	N	N	LAPAROTOMY AND PRIMARY BLADDER REPAIR WITH SPC	PATIENT DISCHARGED ON 30TH HOSPITAL DAY WITHOUT COMPLICATIONS
7	RAMASAMY	52	MALE	67543	HEMATURIA	ACCIDENTAL FALL	MILD DISTENSION + MILD TENDERNESS +	98	110/90	NIL	NORMAL	MEMBRANOUS URETHRA RUPTURE	BS-169,UREA-17,CR-0.7,NA-145,K-2.7	HB-10.4,HCT-28.7,PLT-105000,WBC-10500	N	N	N	Y	N	CONSERVATIVE MANAGEMENT BY GENTLE CATHETERIZATION	PATIENT DISCHARGED ON 12TH HOSPITAL DAY WITHOUT COMPLICATIONS
8	BIKASH SINGH	25	MALE	61545	PAIN ABDOMEN WITH DIFFICULTY IN BREATHING	RTA FALL FROM 2 WHEELER	DIFFUSE TENDERNESS WITH GUARDING IN ALL OVER ABDOMEN	120	90/70	1.DISTAL PANCREATIC DISRUPTION. 2.LEFT HEMOTHORAX	FREE FLUID ABDOMEN	GRADE 3 LEFT RENAL INJURY	BS-117,UREA-45,CR-1.4,NA-139,K-5.2	HB-9.1,HCT-33.6,PLT-137000,WBC-10900	Y	N	N	N	N	LAPAROTOMY,LEFT NEPHRECTOMY,DISTAL PANCREATECTOMY AND SPLENECTOMY	PATIENT DISCHARGED ON 32ND HOSPITAL DAY

9	RAMESH	35	MALE	85489	HEMATURIA	ACCIDENTAL FALL	SOFT,BS +	88	120/80	NIL	NORMAL	MEMBRANOUS URETHRA RUPTURE	BS-81,UREA-50,CR-1.1,NA-140,K-3.4	HB-11.1,HCT-33.4,PLT-67000,WBC-10400	N	N	N	Y	N	CONSERVATIVE MANAGEMENT BY GENTLE CATHETERIZATION	PATIENT DISCHARGED ON 10TH HOSPITAL DAY WITHOUT COMPLICATIONS
10	SUPRIYAKUMARI	38	FEMALE	90828	HEMATURIA WITH ABDOMEN PAIN	RTA FALL FROM 2 WHEELER	DIFFUSE TENDERNESS WITH GUARDING IN LOWER ABDOMEN	110	120/70	NIL	? RIGHT RENAL INJURY	GRADE 4 RIGHT RENAL INJURY	RBS-60,UREA-68,CR-1.5,NA-134,K-3.7	HB-9.8,HCT-31.6,PLT-189000,WBC-9300	Y	N	N	N	N	CONSERVATIVE MANAGEMENT	PATIENT DISCHARGED ON 25TH HOSPITAL DAY
11	KUMAR	45	MALE	93501	PAIN ABDOMEN	RTA TWO WHEELER VS 4 WHEELER	DIFFUSE TENDERNESS WITH GUARDING AND RIGIDITY	134	80/40	1.BILATERAL HEMOTHORAX-BILATERAL ICD 2.GRADE 2 SPLENIC INJURY 3.GRADE 3 LIVER INJURY 4.TEMPORAL BONE FRACTURE	FREE FLUID ABDOMEN WITH ILL DEFINED HYPODENSITY IN THE SEGMENT 6 AND 7 OF RIGHT LOBE OF	GRADE 3 LEFT RENAL INJURY	RBS-109,UREA-32,CR-1.3,NA-147,K-3.9	HB-6.8,HCT-27.4,PLT-111000,WBC-9200	Y	N	N	N	N	CONSERVATIVE MANAGEMENT	PATIENT EXPIRED WITHIN 24 HOURS
12	VINOTH KUMAR	22	MALE	37402	PAIN ABDOMEN WITH DISTENSION WITH HEMATURIA	RTA 2 WHEELER VS 4 WHEELER	DIFFUSE TENDERNESS WITH GUARDING AND RIGIDITY	104	100/70	NIL	1.LEFT ILIAC WING AND ACETABULAM FRACTURE 2.GRADE 3 DISTAL PANCREATIC	GRADE 4 LEFT RENAL INJURY	RBS-119,UREA-22,CR-1.1,NA-147,K-3.9	HB-8.4,HCT-33.4,PLT-211000,WBC-11200	Y	N	N	N	N	LAPAROTOMY,LEFT NEPHRECTOMY,DISTAL PANCREATECTOMY AND SPLENECTOMY	PATIENT WAS DISCHARGED ON THE 28TH POD WITHOUT ANY COMPLICATIONS
13	GANGAIAH	50	MALE	21917	PAIN IN SCROTUM	ACCIDENTAL INJURY	PARTIAL DEGLOVING INJURY OF SCROTUM EXPOSING TESTIS	100	110/80	NIL	NORMAL	NORMAL	RBS-109,UREA-32,CR-0.6,NA-137,K-3.9	HB-9.2,HCT-27.4,PLT-111000,WBC-11200	N	N	N	N	Y	PRIMARY SUTURING	PATIENT WAS DISCHARGED ON THE 12TH POD WITHOUT ANY COMPLICATIONS
14	SARAVANAN	56	MALE	4917	PAIN ABDOMEN	RTA FOUR WHEELER VS TWO WHEELER	DIFFUSE TENDERNESS WITH GUARDING IN LEFT LOWER ABDOMEN	106	100/70	NIL	FREE FLUID ABDOMEN ?LEFT RENAL INJURY	GRADE 4 LEFT RENAL INJURY	RBS-129,UREA-50,CR-1.3,NA-138,K-3.8	HB-10.2,HCT-30.4,PLT-211000,WBC-10200	Y	N	N	N	N	CONSERVATIVE MANAGEMENT	PATIENT DISCHARGED ON THE 24TH HOSPITAL DAY WITHOUT ANY COMPLICATIONS
15	JYOTHI RAMALINGAM	39	MALE	94751	PAIN ABDOMEN	ACCIDENTAL FALL	GUARDING AND TENDERNESS OVER LOWER ABDOMEN	110	130/80	NIL	FREE FLUID ABDOMEN	INTRAPERITONEAL BLADDER RUPTURE	RBS-109,UREA-32,CR-0.7,NA-138,K-3.9	HB-11.2,HCT-30.4,PLT-111000,WBC-9200	N	N	Y	N	N	LAPAROTOMY AND PRIMARY BLADDER REPAIR WITH SPC	PATIENT DISCHARGED ON THE 14TH HOSPITAL DAY WITHOUT ANY COMPLICATIONS
16	KANNAN	26	MALE	72734	PAIN ABDOMEN WITH HEMATURIA	ACCIDENTAL FALL	TENDERNESS OVER LOWER ABDOMEN	114	140/70	RIGHT PUBIC RAMUS FRACTURE	NORMAL	MEMBRANOUS URETHRA RUPTURE	RBS-89,UREA-32,CR-0.6,NA-137,K-3.8	HB-11.2,HCT-32.4,PLT-121000,WBC-8200	N	N	N	Y	N	CONSERVATIVE MANAGEMENT BY GENTLE CATHETERIZATION	PATIENT DISCHARGED ON THE 20TH HOSPITAL DAY WITHOUT ANY COMPLICATIONS
17	GUNA	34	MALE	46783	PAIN ABDOMEN WITH HEMATURIA	RTA TWO WHEELER VS BUS	GUARDING AND TENDERNESS OVER LOWER ABDOMEN	100	120/70	NIL	NORMAL	EXTRA PERITONEAL BLADDER RUPTURE	RBS-79,UREA-38,CR-1.2,NA-137,K-3.8	HB-8.2,HCT-27.4,PLT-101000,WBC-6200	N	N	Y	N	N	CONSERVATIVE MANAGEMENT	PATIENT DISCHARGED ON THE 12TH HOSPITAL DAY WITHOUT ANY COMPLICATIONS

18	SATHISH	20	MALE	72177	PAIN ABDOMEN WITH DIFFICULTY IN BREATHING WITH HEMATURIA	RTA PEDASTRIAN VS FOUR WHEELER	DIFFUSE TENDERNESS WITH GUARDING IN RIGHT HYPOCHONDRIUM	108	120/70	1.RIGHT HEMOTHORAX-RIGHT ICD 2.GRADE 4 LIVER INJURY	HYPODENSE LESION IN SEGMENT 7 AND 8 OF RIGHT LOBE OF LIVER WITH FREE FLUID	GRADE 5 RIGHT RENAL INJURY	RBS-89,UREA-22,CR-0.7,NA-138,K-3.8	HB-9.4,HCT-27.4,PLT-121000,WBC-10200	Y	N	N	N	N	CONSERVATIVE MANAGEMENT	PATIENT DISCHARGED ON THE 35TH HOSPITAL DAY WITHOUT ANY COMPLICATIONS
19	KAVITHA	26	FEMALE	32321	HEMATURIA	ACCIDENTAL FALL	TENDERNESS OVER LOWER ABDOMEN	102	130/80	LEFT ALA OF SACRUM FRACTURE	FREE FLUID	INTRAPERITONEAL BLADDER RUPTURE	RBS-79,UREA-32,CR-0.9,NA-137,K-3.9	HB-10.4,HCT-30.4,PLT-131000,WBC-9200	N	N	Y	N	N	LAPAROTOMY AND PRIMARY BLADDER REPAIR WITH SPC	PATIENT DISCHARGED ON THE 20TH POD WITHOUT ANY COMPLICATIONS
20	BALA	34	MALE	21562	DEGLOVING INJURY OF PENIS	RTA FALL FROM 2 WHEELER	DEGLOVING INJURY OF PENIS INVOLVING SKIN	84	120/70	NIL	NORMAL	NORMAL	RBS-89,UREA-32,CR-1.1,NA-136,K-4.0	HB-11.4,HCT-32.4,PLT-141000,WBC-8200	N	N	N	N	Y	DEBRIDEMENT AND WOUND SUTURING	PATIENT DISCHARGED ON THE 16TH POD WITHOUT ANY COMPLICATIONS
21	SESU	72	MALE	81507	PAIN ABDOMEN	RTA PEDASTRIAN VS TWO WHEELER	TENDERNESS OVER LOWER ABDOMEN	101	120/80	NIL	FREE FLUID	INTRAPERITONEAL BLADDER RUPTURE	RBS-119,UREA-33,CR-1.3,NA-147,K-2.9	HB-10.2,HCT-32.4,PLT-211000,WBC-12200	N	N	Y	N	N	LAPAROTOMY AND PRIMARY BLADDER REPAIR WITH SPC	PATIENT DISCHARGED ON THE 13TH POD WITHOUT ANY COMPLICATIONS
22	SANTHOSH	25	MALE	11023	PAIN ABDOMEN	RTA FALL FROM 2 WHEELER	TENDERNESS OVER LOWER ABDOMEN	96	120/80	NIL	FREE FLUID	INTRAPERITONEAL BLADDER RUPTURE	RBS-101,UREA-38,CR-1.0,NA-142,K-4.2	HB-13.2,HCT-32.4,PLT-201000,WBC-12200	N	N	Y	N	N	LAPAROTOMY AND PRIMARY BLADDER REPAIR WITH SPC	PATIENT DISCHARGED ON THE 16TH POD WITHOUT ANY COMPLICATIONS
23	SASIKUMAR	17	MALE	89670	DEGLOVING INJURY OF SCROTUM	RTA PEDASTRIAN VS 2 WHEELER	DEGLOVING INJURY OF SCROTUM EXPOSING TESTIS	106	110/70	NIL	NORMAL	NORMAL	RBS-169,UREA-64,CR-0.9,NA-139,K-4.0	HB-9.2,HCT-24.9,PLT-151000,WBC-10000	N	N	N	N	Y	LEFT ORCHIDECTOMY PRIMARY REPAIR WITH TESTIS IMPLANTED IN THIGH POUCH	PATIENT DISCHARGED ON 25 TH POD WITHOUT ANY COMPLICATIONS
24	METHAJ BANU	17	FEMALE	77705	URINARY RETENTION	ACCIDENTAL FALL	TENDERNESS WITH GUARDING IN LOWER ABDOMEN	88	100/70	LEFT ACETABULAR FRACTURE	NORMAL	EXTRA PERITONEAL BLADDER RUPTURE	RBS-70,UREA-16,CR-0.9,NA-138,K-3.7	HB-9.4,HCT-30.4,PLT-205000,WBC-6800	N	N	Y	N	N	CONSERVATIVE MANAGEMENT	PATIENT DISCHARGED ON 15 TH HOSPITAL DAY WITHOUT ANY COMPLICATIONS
25	SARAVANAN	49	MALE	4917	PAIN ABDOMEN WITH HEMATURIA	RTA PEDESTRIAN VS LORRY	TENDERNESS WITH GUARDING IN LEFT LUMBAR REGION	110	90/60	RIGHT PNEUMOTHORAX-RIGHT ICD	FREE FLUID ABDOMEN	GRADE 4 LEFT RENAL INJURY	RBS-70,UREA-46,CR-1.9,NA-138,K-5.7	HB-10.9,HCT-33.4,PLT-154000,WBC-10200	Y	N	N	N	N	CONSERVATIVE MANAGEMENT	PATIENT DISCHARGED ON 18 TH HOSPITAL DAY WITHOUT ANY COMPLICATIONS
26	PRATHAP	31	MALE	83278	PAIN ABDOMEN	ASSAULT WITH KNIFE	TENDERNESS WITH GUARDING IN LOWER ABDOMEN	90	110/60	NIL	FREE FLUID ABDOMEN	INTRAPERITONEAL BLADDER RUPTURE	RBS-122,UREA-29,CR-1.0,NA-132,K-3.0	HB-9.2,HCT-38.4,PLT-12000,WBC-8000	N	N	Y	N	N	LAPAROTOMY AND PRIMARY BLADDER REPAIR WITH SPC	PATIENT DISCHARGED ON 12TH POD WITHOUT COMPLICATIONS

27	ARUN	34	MALE	67924	HEMATURIA	ACCIDENTAL FALL	TENDERNESS IN LOWER ABDOMEN	88	130/70	RIGHT ILIAC WING FRACTURE	NORMAL	MEMBRANOUS URETHRA RUPTURE	RBS-92,UREA-39,CR-1.0,NA-133,K-3.6	HB-9.2,HCT-28.4,PLT-94000,WBC-12200	N	N	N	Y	N	CONSERVATIVE MANAGEMENT BY GENTLE CATHETERIZATION	PATIENT DISCHARGED ON 12 TH HOSPITAL DAY WITHOUT ANY COMPLICATIONS
28	JULIE	45	FEMALE	76787	PAIN ABDOMEN	RTA BUS VS PEDESTRIAN	DIFFUSE GUARDING ,PELVIC COMPRESSION TEST POSITIVE	98	90/60	1.FRACTURE RIGHT FEMUR,FRACTURE SUPERIOR AND INFERIOR PUBIC RAMUS RIGHT SIDE, 2.RIGHT HEMOTHORAX RIGHT ICD DONE	FREE FLUID ABDOMEN	GRADE 3 RIGHT RENAL INJURY	RBS-92,UREA-39,CR-1.8,NA-133,K-3.6	HB-6.2,HCT-23.4,PLT-94000,WBC-12200	Y	N	N	N	N	CONSERVATIVE MANAGEMENT	PATIENT EXPIRED FOUR HOURS AFTER SURGERY DESPITE BEST SICU CARE
29	UNKNOWN 1	34	MALE	56789	HEMATURIA	ACCIDENTAL FALL	TENDERNESS AND GUARDING IN LOWER ABDOMEN	102	120/70	FRACTURE RIGHT PUBIC BONE	NORMAL	EXTRA PERITONEAL BLADDER RUPTURE	RBS-92,UREA-39,CR-1.0,NA-138,K-3.6	HB-10.2,HCT-33.4,PLT-114000,WBC-11000	N	N	Y	N	N	CONSERVATIVE MANAGEMENT BY GENTLE CATHETERIZATION	PATIENT DISCHARGED ON THE 17TH HOSPITAL DAY
30	SRIRAM	28	MALE	53214	HEMATURIA	RTA FALL FROM 2 WHEELER	TENDERNESS AND GUARDING IN LOWER ABDOMEN	100	110/70	NIL	FREE FLUID ABDOMEN	INTRAPERITONEAL BLADDER RUPTURE	RBS-112,UREA-29,CR-1.O,NA-143,K-3.4	HB-11.4,HCT-34.1,PLT-134000,WBC-8200	N	N	Y	N	N	LAPARATOMY AND PRIMARY BLADDER REPAIR WITH SPC	PATIENT DISCHARGED ON THE 17TH HOSPITAL DAY